

THAR DESERT



- The Thar Desert, also called the **Great Indian Desert** is an arid region located in the north-western part of the Indian subcontinent.
- It is considered to be the 9th largest subtropical desert in the world.
- It **lies mostly in** the Indian state of **Rajasthan**.
- The desert also **extends into** the southern portion of **Haryana and Punjab** and into the northern part of **Gujarat**.
- A portion of the desert (**15 percent**) **lies in the** Punjab and Sind regions of **Pakistan**.
- It covers some 200,000 sq.km. of territory.
- The name Thar is derived from thul, the general term for the region's sand ridges.

Boundaries:

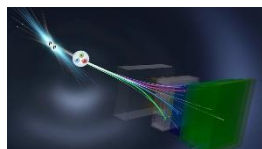
- It is bounded on the north-west by the **Sutlej River** and on the east by the **Aravalli Mountain Ranges**.
- It is also bounded on the **south by the salt marsh** known as the **Rann of Kutch**, and on the **west by the Indus Valley**.
- **About a tenth** of the ecoregion is **sand dunes**, while the **rest is craggy rock formations** and compacted **salt lake bottoms**.
- It **does not have any Oasis** which is unusual compared to other large deserts.

Climate:

- The Thar Desert has an **extreme climate**:
- **Summers are very hot**, with temperatures reaching 50°C.
- **Winters are cold**, with temperatures dropping to near freezing.
- **Rainfall is very low**, between **100–500 mm** per year, mostly during the monsoon season.
- **Strong dust storms** are common in the summer.
- There is a **single river** that flows through the desert, the **Luni River**.

- The sparse vegetation consists of plants adapted to growing in dry conditions, known as **xerophilous plants**.
- It is the **most densely populated desert in the world** (83 people per sq. km).
- **Mineral Resource:**
 - It is rich in a variety of minerals, including one of the **largest coal reserves** in India.
 - It is also a major source of **gypsum, limestone, salt**, bauxite, silica, etc.

MATTER AND ANTI-MATTER



Matter

- **Matter** is anything that has **mass** and **occupies space**, composed of **atoms and molecules**.
- **Primary States:**
 - **Solid:** Fixed shape and volume.
 - **Liquid:** Fixed volume, no fixed shape.
 - **Gas:** No fixed shape or volume.
- **Other States – Plasma, Bose-Einstein Condensate and Fermionic Condensate.**
- **State Changes:** Driven by **temperature and pressure**, e.g., **melting, evaporation, condensation**.

Antimatter

- **Antimatter** consists of particles that are **mirror counterparts of matter**, with **opposite electric charge**.
 - **Electron → Positron, Proton → Antiproton, Neutron → Antineutron**
- **Creation:** Both matter and antimatter were created during the **Big Bang** in equal amounts.
- **Interaction:** When **matter and antimatter collide**, they **annihilate each other**, producing **gamma rays**.



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CRITICAL MINERALS



- **Critical minerals** are those that are **essential for modern technologies and national security**, but have **supply chain risks** due to their **limited availability or geographical concentration**.

- Their **'criticality'** changes over time depending on **technological demand and supply dynamics**.

Legal and Regulatory Framework

- **30 critical minerals** were identified by a **Ministry of Mines committee** in 2022.
 - **List of India's 30 Critical Minerals:** Antimony, Beryllium, Bismuth, Cobalt, Copper, Gallium, Germanium, Graphite, Hafnium, Indium, Lithium, Molybdenum, Niobium, Nickel, Platinum Group Elements (PGE), Phosphorous, Potash, Rare Earth Elements (REE), Rhenium, Silicon, Strontium, Tantalum, Tellurium, Tin, Titanium, Tungsten, Vanadium, Zirconium, Selenium, and Cadmium.
- **24 minerals** added to **Part D of Schedule I** of the **MMDR Act, 1957**, granting **Central Government exclusive auctioning powers**.
- A **Centre of Excellence for Critical Minerals (CECM)** will regularly **review the mineral list** and advise policy.

Key Institutions and their Role

- **Geological Survey of India (GSI):** Leading exploration under **UNFC classification** and **MEMC Rules, 2015**.
- **Department of Atomic Energy:** Identified **1,11,845 tonnes of REE oxide** in Balotra, Rajasthan.
- **IREL (India) Limited:** Leading **processing of beach sand minerals** and operating **Rare Earth Extraction and Refining Units**.

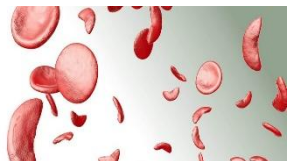
International Cooperation

- **KABIL** (Khanij Bidesh India Ltd) signed agreements with:
 - **CAMYEN SE** (Argentina) for **lithium exploration** over **15,703 hectares**.
 - **Critical Minerals Office, Australia** for **lithium and cobalt projects**.
- **Top Global Producers of Critical Minerals:** Chile, Indonesia, Congo, China, Australia, and South Africa.

About the National Critical Mineral Mission (NCMM)

- The NCMM is a strategic initiative by the **Ministry of Mines** aimed at ensuring **long-term availability, security, and processing** of critical minerals that are vital for **clean energy technologies, economic development, and national security**.
- It aligns with India's commitments to **net-zero emissions by 2070** and reducing the **emissions intensity of GDP by 45% by 2030** (from 2005 levels).

SICKLE CELL DISEASE (SCD)



- It is the most common **inherited blood disorder** that **affects your red blood cells (RBCs)**.
- It is marked by **flawed hemoglobin**.
 - **Hemoglobin** is the molecule in red blood cells (RBCs) that **carries oxygen to the tissues of the body**.
- Sickle cell disease **interferes with the delivery of oxygen** to the tissues.
- **What causes it?**
 - SCD is caused by a variant (change) in a gene that has instructions for your body to make one part of the hemoglobin.
 - This changed gene is sometimes called a **sickle cell gene**.
 - **People with SCD are born with two sickle cell genes, one from each parent.**

- If you are born with one sickle cell gene, it's called sickle cell trait.
- People with sickle cell trait are generally healthy, but they can pass the defective gene on to their children.
- **Symptoms:**
 - **Early stage:** Extreme **tiredness** or fussiness from **anemia**, painfully swollen hands and feet, and jaundice.
 - **Later stage:** **Severe pain, anemia**, organ damage, and infections.
- **Treatments:**
 - A **bone marrow transplant** (stem cell transplant) can cure sickle cell disease.
 - However, there are treatments that can help relieve symptoms, lessen complications, and prolong life.
 - **Gene therapy** is also being explored as **another potential cure**.
 - The UK recently became the first country to approve gene therapy treatment for sickle cell disease.

AKASH AIR DEFENCE MISSILE SYSTEM



- It is a **Short Range Surface to Air Missile System** to protect vulnerable areas and points from air attacks.
- It was indigenously designed and **developed** by India's Defence Research and Development Organisation (DRDO) and is produced by Hyderabad-based **Bharat Dynamics Ltd (BDL)**.
- The system was inducted into the Indian Air Force in 2014 and in the Indian Army in 2015.
- In 2022, **Armenia** became the **first foreign country to buy** this missile system.
- **Features:**
 - It is 5.8 m long, has a diameter of 350 mm and a wingspan of 1,105mm.
 - **Range of Operation : 4.5 km to 25 km**

- Altitude of Operation : 100 m up to 20 km
- Guidance System : Command Guidance
- Target types: Helicopters, Fighter aircrafts, UAVs etc.
- It can **simultaneously engage multiple targets** in Group Mode or Autonomous Mode.
- It has built-in Electronic Counter-Counter Measures (ECCM) features.
- It has high immunity against active and passive jamming.
- The entire weapon system has been configured on **mobile platforms**.
- **Open system architecture** ensures adaptability to existing and futuristic Air Defence environments.
- The most important element of the Akash SAM system battery is its **high-power, multi-function Rajendra phased array radar**.
 - The 3D passive electronically scanned array Rajendra radar (PESA) can **electronically scan and guide the missile** towards targets.
 - It **provides information** on the range, azimuth, and height of a flying target.

BEAR MARKET



- A bear market is a **financial market experiencing prolonged price declines, generally of 20% or more**.
- A bear market usually **occurs along with widespread investor pessimism, large-scale liquidation of securities and other assets, and a weakening economy**.
- A bear is an investor who **expects prices to decline** and, on this assumption, **sells a borrowed security or commodity in the hope of buying it back later at a lower price**, a speculative transaction called **selling short**.



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- Bear markets are often associated with declines in an overall market or index, but **individual securities** or commodities can also be considered to be in a bear market if they experience a decline of **20% or more** over a sustained period of time, typically **two months or more**.
- Bear markets also **may accompany** general economic downturns such as a **recession**.
- They are seen as the **opposite of upward-trending bull markets**.

US PAUSES HIGHER TARIFFS FOR MOST COUNTRIES BUT HITS CHINA HARDER

President Donald Trump temporarily suspended most tariffs for 90 days amid a global market crisis, while sharply increasing tariffs on Chinese imports to 125%.

The countries included in the tariff pause will now face a reduced 10% tariff, as the U.S. plans individual negotiations with each nation.



A Brewing US-China Trade War

- A full-scale trade conflict is looming as President Trump threatens over 100% tariffs on Chinese goods, effectively creating a trade embargo.

- This move could spark a dangerous decoupling between the world's largest economies.
- **The Critical Questions**
 - Will these measures **hurt China more than the US?**
 - While Trump is open to **negotiations with other countries**, the long-term impact of this policy gamble is still uncertain.

Escalating Tariff War

- Both countries remain unwilling to back down. China vows to “fight to the end” and has imposed retaliatory tariffs.

- **Immediate Consequences of Tariffs**
 - **High costs** could make imports from China prohibitively expensive.
 - The US may struggle due to dependence on Chinese goods, including:
 - Critical drug ingredients
 - Rare earth elements (vital for defense tech)
 - High-end consumer products
 - Washington might be forced to find alternative suppliers or reduce consumption.
- **US Weaknesses and Political Pressure**
 - **Consumer Impact** - Americans rely on Chinese imports for everyday essentials – clothing, shoes, electronics. Tariff costs are passed on to consumers, especially affecting low-income groups.
 - **Limited Fiscal Tools** - Washington has few options left other than extending Trump-era corporate tax cuts.
- **China's Internal Narrative and Xi's Image**
 - The Chinese view the trade war as **US bullying**, and **Xi cannot afford to appear weak**.
 - Domestic **rhetoric and nationalism** make it harder for China to **back down** unless the US makes a move first.

THE PANDEMIC — LOOKING BACK, LOOKING FORWARD

Critical Lessons from the Pandemic

- **Fragile Foundations: Trust and Public Health**
 - Perhaps the most critical and sobering lesson from the pandemic is the **fragility of public trust**.
 - The **pandemic exposed severe cracks in this trust globally**.
 - **In India**, for example, early underreporting of COVID-19 infections and excess mortality suggested **systemic weaknesses and eroded public confidence**.
- **Technology's Dual Role: Catalyst and Divider**

- Technology emerged as both saviour and stumbling block.
- **On one hand, it became indispensable.** Artificial Intelligence (AI) played a crucial role in accelerating pharmaceutical research and drug discovery, with a sharp post-pandemic spike in AI-linked patents testifying to its growing influence.

The Way Forward

- **Addressing Systemic Weaknesses and Structural Gaps**
 - **COVID-19 peeled back the veneer on health systems worldwide**, revealing vulnerabilities that had long been ignored.
 - **In the Global South**, particularly India, weak infrastructure, underfunded institutions, and **inadequate public goods provision became glaringly evident.**
 - **Calls for universal health coverage gained urgency**, as did the need to invest in national oxygen capabilities to prepare for future respiratory pandemics.
 - **Hybrid care models**, combining digital innovation with existing physical infrastructure, **emerged as a cost-effective pathway forward.**
 - Likewise, **public-private partnerships in healthcare and research flourished during the crisis.**

Conclusion

- Five years on, **humanity has made measurable progress in adapting to the disruptions of COVID-19.**
- **Health systems are more alert**, innovation is surging, and economic recovery is underway. But much remains unfinished.
- **The question is not just whether we have survived the pandemic, but whether we have learned from it.**
- Will we work toward a unified vision of **One World, One Health**, or will we regress into fragmented, protectionist responses driven by narrow national interests?